

What is claimed is:

SUB A<sub>1</sub> >

1. Method of producing nitrogenous semiconductor crystal materials and particularly of strata on wafers of the form  $A_x B_y C_z N_v M_w$ , wherein A, B, C represent elements of group II or III, N represents nitrogen, M represents an element of group V, with the exception of N, or group VI, and X, Y, Z, V, W represent the mol fraction of each element in this compound, operating on a device comprising

- a reaction chamber wherein at least one wafer support is disposed,
- at least one gas inlet through which the process gases flow into said reaction chamber in a controlled succession,
- possibly a gas mixing system,
- a gas outlet through which the process gases are discharged again after they have flown through said reaction chamber, and a controller that controls or controls in a closed loop, respectively, the type or the composition of the in-flowing process gases and the temperature of the wafer, as well as possibly further parts of said reaction chamber,

**characterised in** that for the selective adjustment of the characteristics of the materials so produced, in addition to the control of the absolute temperature of the wafer and/or at least one part of said reaction chamber, also the temperature variation of at least this part or another part of said reaction chamber, e.g. the gas inlet  $T_1$ , the chamber walls  $T_2$ , the principal wafer support  $T_3$ , rotating individual wafer supports  $T_4$ , the gas outlet  $T_5$ , said gas mixing system  $T_6$ , the upper side of said reaction chamber  $T_7$  and/or said heating system  $T_8$  are adjusted with temperature variation profiles within the range of seconds in such a way that the variation of the process parameters so caused results in a dynamic control of the thermal processes leading to the production of the materials.

2. Method according to Claim 1,

**characterised** by controlling the temperature  $T_1$  below the condensation temperature of the gases and by adjustment of the temperature for avoiding the formation of addition compounds.

3. Method according to Claim 1 or 2,

**characterised** by control of the temperature  $T_2$  as equal to the temperature  $T_3$ .

4. Method according to any of the Claims 1 to 3,

**characterised** by controlling the temperature  $T_3$  as a constant and up to 1600 °C, with required reproducible temperature variations of up to 250 °C per minute.

5. Method according to any of the Claims 1 to 4,

**characterised** by controlling the temperature  $T_4$  as a correlate to the temperature  $T_3$  with an accuracy of 0.1 °C.

6. Method according to any of the Claims 1 to 5,

**characterised** by controlling the temperature  $T_5$  to a value smaller than the value of the temperatures  $T_4$  and  $T_3$ .

7. Method according to any of the Claims 1 to 6,

**characterised** by controlling the temperature  $T_6$  as a constant smaller than  $T_1$ .

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8. Method according to any of the Claims 1 to 7,  
**characterised** by controlling the temperature  $T_7$  as a constant and correlate to  $T_3$ .
9. Method according to any of the Claims 1 to 8,  
**characterised** by controlling the temperature  $T_8$  as a constant and correlate to  $T_3$ .
10. Method according to any of the Claims 1 to 9,  
**characterised** by additionally controlling a temperature-dependent gas flow variation.
11. Method according to any of the Claims 1 to 10,  
**characterised** by additionally controlling a temperature-dependent total pressure variation in the reaction chamber.
12. Method according to any of the Claims 1 to 11,  
**characterised** by additionally controlling a temperature-dependent principal carrier gas variation in the reaction chamber.
13. Method according to any of the Claims 1 to 12,  
**characterised** by additionally controlling temperature-dependent interrupts in the production process.
14. Method according to any of the Claims 1 to 13,  
**characterised** by applying the semiconductor materials to be produced on a mechanical carrier of a semiconductor of group IV, a semiconductor of

groups III-V, oxides or any other material resistant to temperatures and the process gases.

15. Method according to any of the Claims 1 to 14,

**characterised** by pre-treating said mechanical carrier by applying lines, dots, or by carrying out other steps for surface treatment, or by partially covering the surface with other materials or material components.

16. Method according to any of the Claims 1 to 15,

**characterised** by two-stage application of pre-processed  $A_xB_yC_zN_vM_w$  materials.

17. Method according to any of the Claims 1 to 16,

**characterised** by the employment of a temperature-controlled injector.

18. Device for producing nitrogenous semiconductor crystal materials and particularly of strata on wafers of the form  $A_xB_yC_zN_vM_w$ , wherein A, B, C represent elements of group II, or III, N represents nitrogen, M represents an element of group V, with the exception of N, or group VI, and X, Y, Z, V, W represent the mol fraction of each element in this compound, comprising

- a reaction chamber wherein at least one wafer support is disposed,
- at least one gas inlet through which the process gases flow into said reaction chamber in a controlled succession,
- possibly a gas mixing system,
- a gas outlet through which the process gases are discharged again after they have flown through said reaction chamber, and

- a controller that controls or controls in a closed loop, respectively, the type or the composition of the in-flowing process gases and the temperature of the wafer, as well as possibly further parts of said reaction chamber,

**characterised in** that for the selective adjustment of the characteristics of the materials so produced, said controller adjusts, in addition to the control of the absolute temperature of the wafer and/or at least one part of said reaction chamber, also the temperature variation of at least this part or another part of said reaction chamber, e.g. the gas inlet  $T_1$ , the chamber walls  $T_2$ , the principal wafer support  $T_3$ , rotating individual wafer supports  $T_4$ , the gas outlet  $T_5$ , said gas mixing system  $T_6$ , the upper side of said reaction chamber  $T_7$  and/or said heating system  $T_8$  with temperature variation profiles within the range of seconds in such a way that the variation of the process parameters so caused results in a dynamic control of the thermal processes leading to the production of the materials.

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